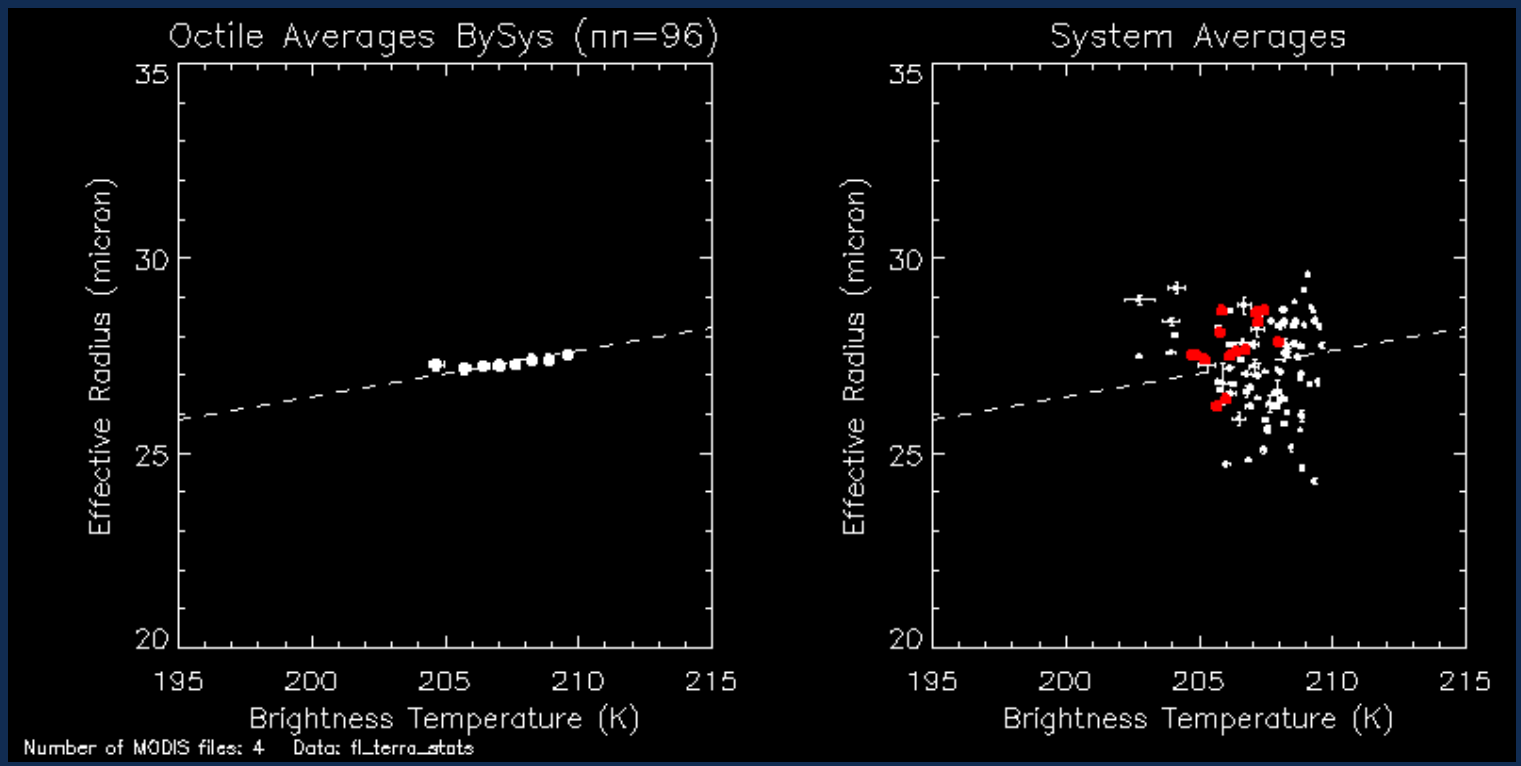
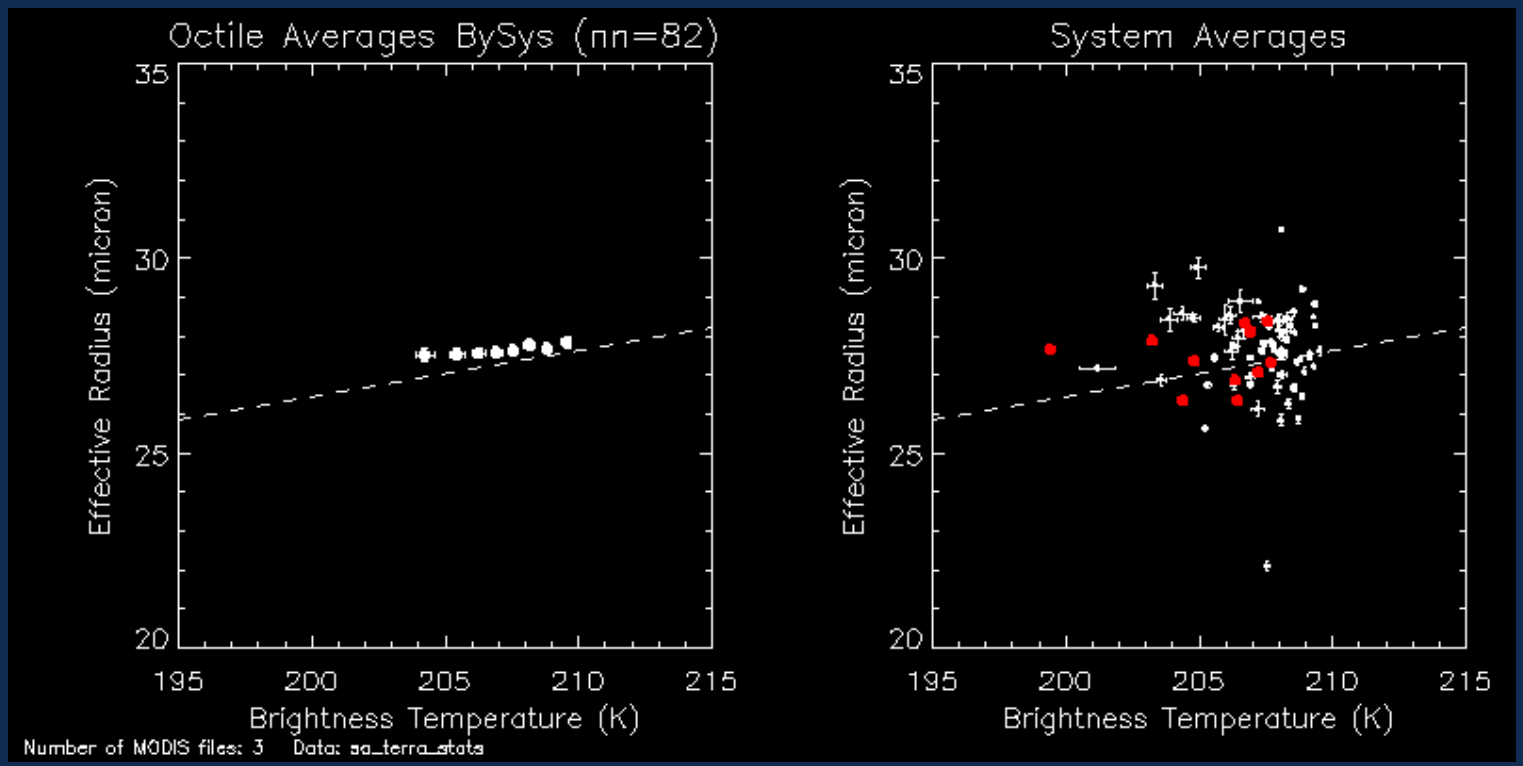
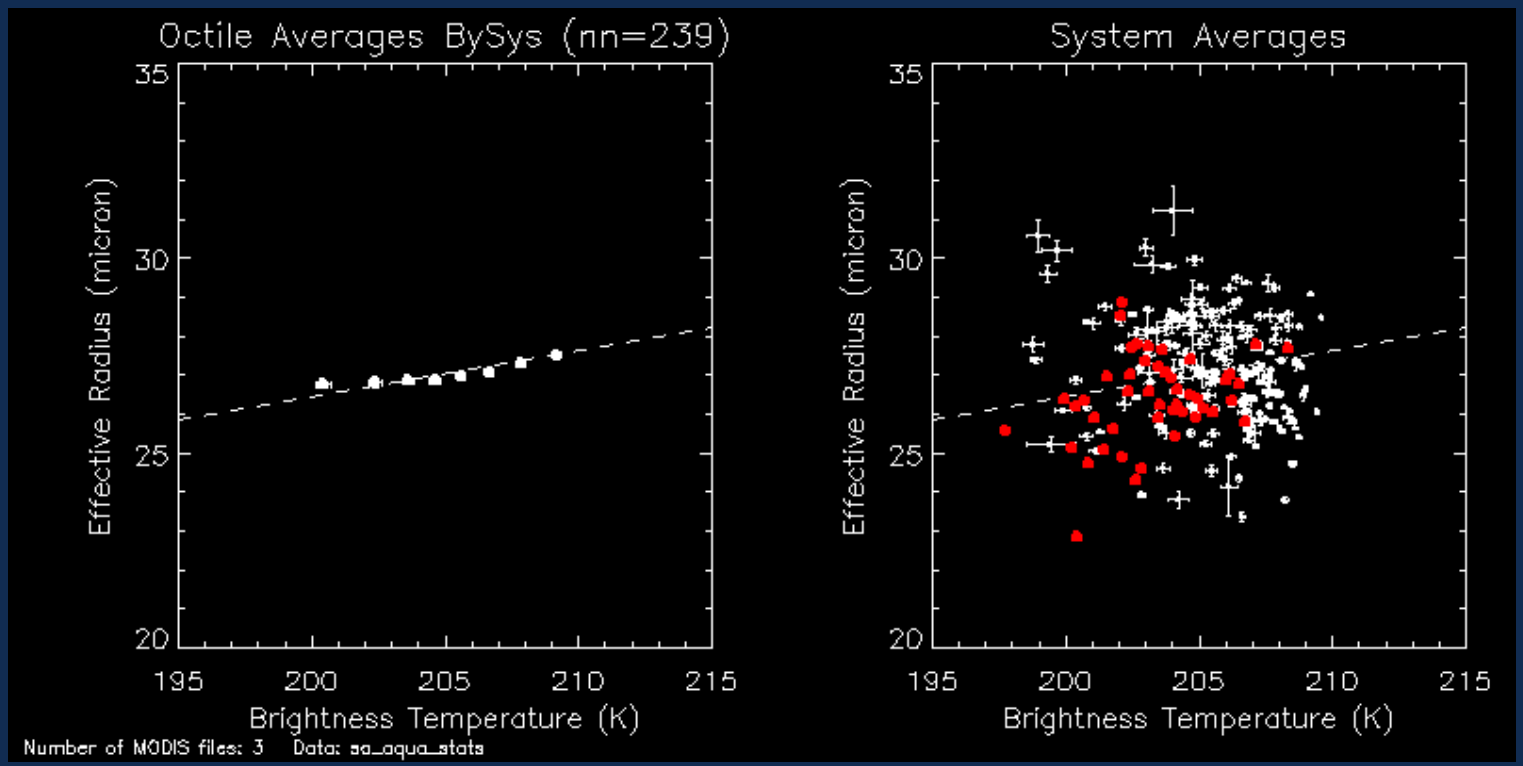
I. MODIS effective radius: FAC systems, Terra



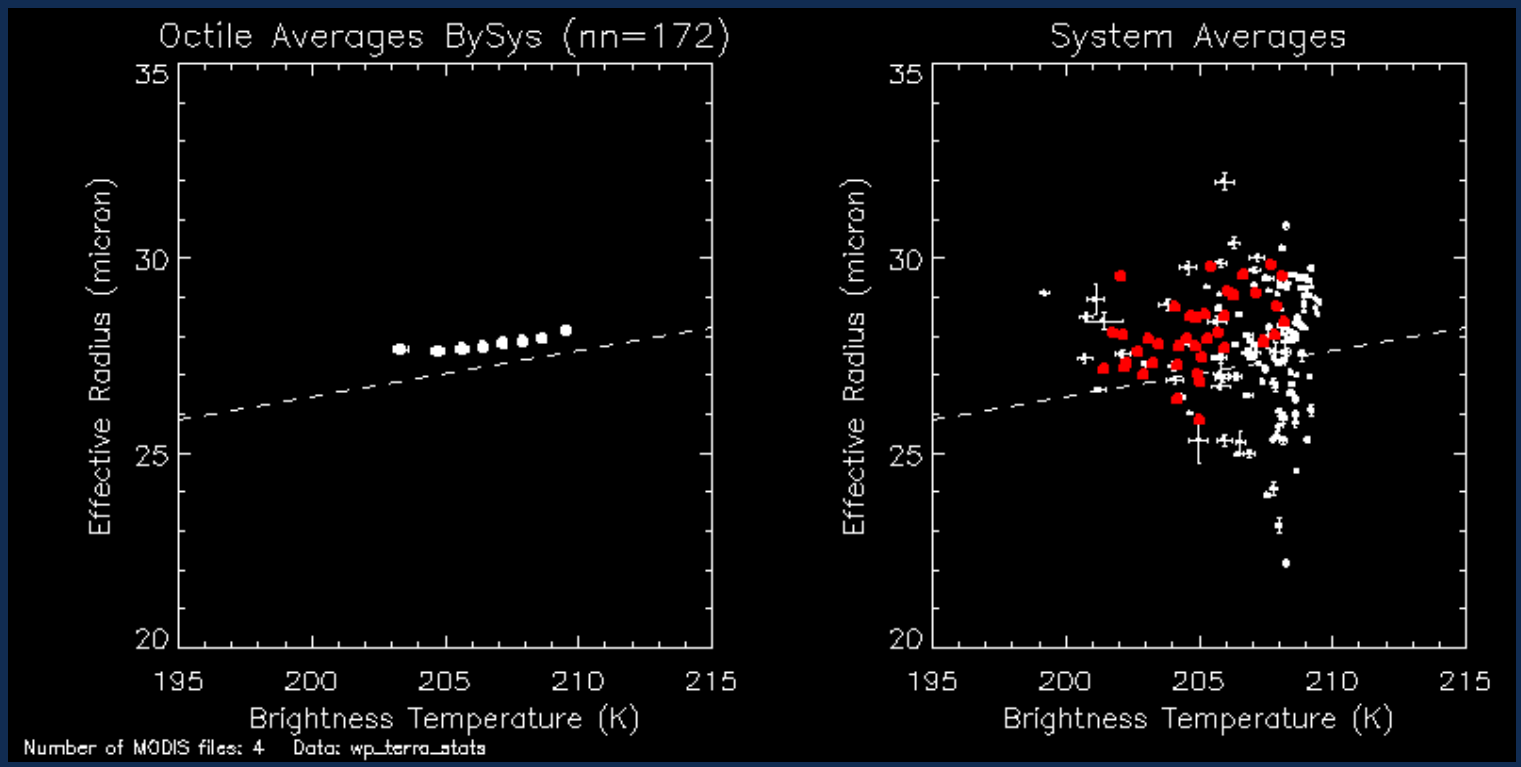
S. America, Terra



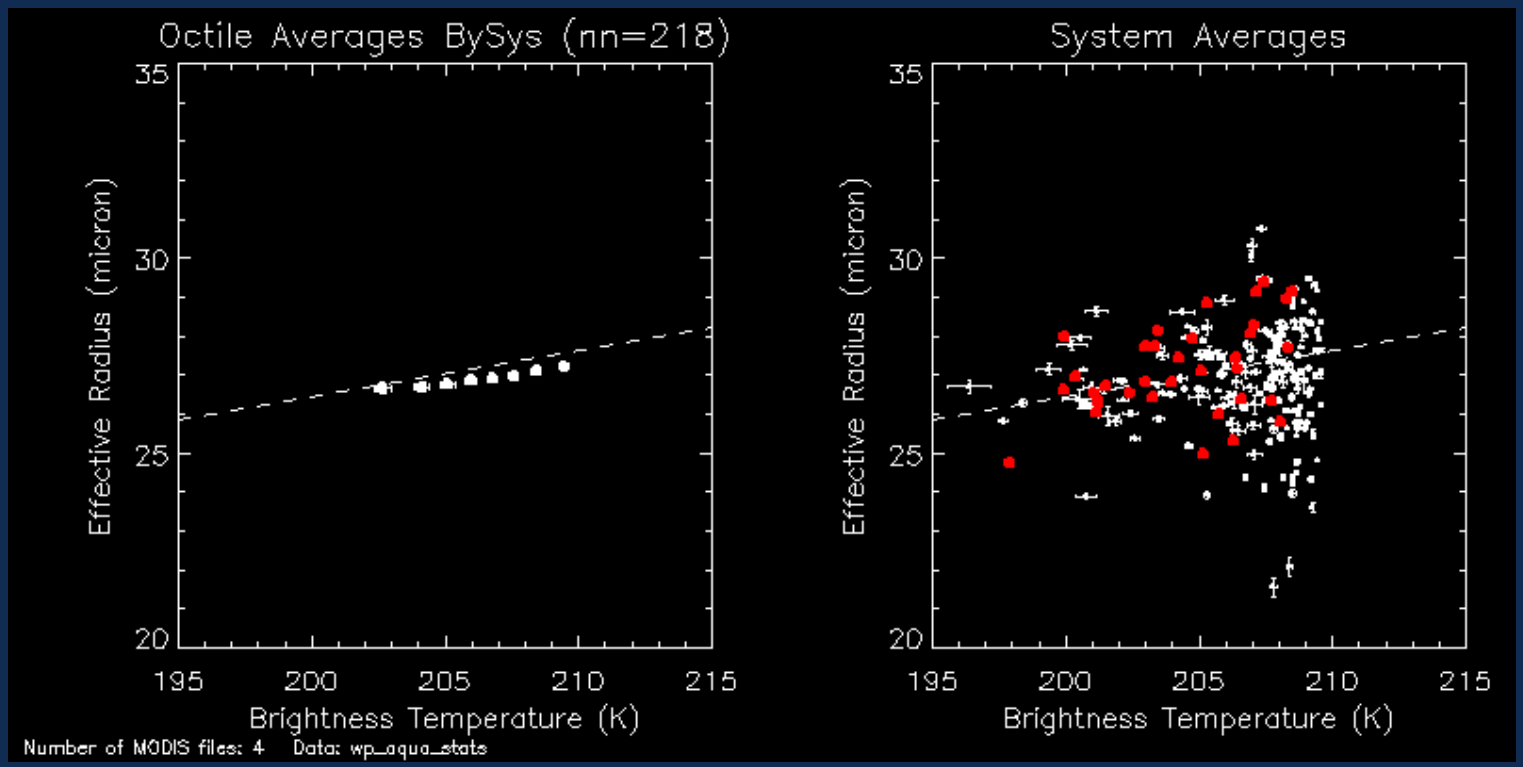
S. America, Aqua



West Pacific, Terra



West Pacific, Aqua

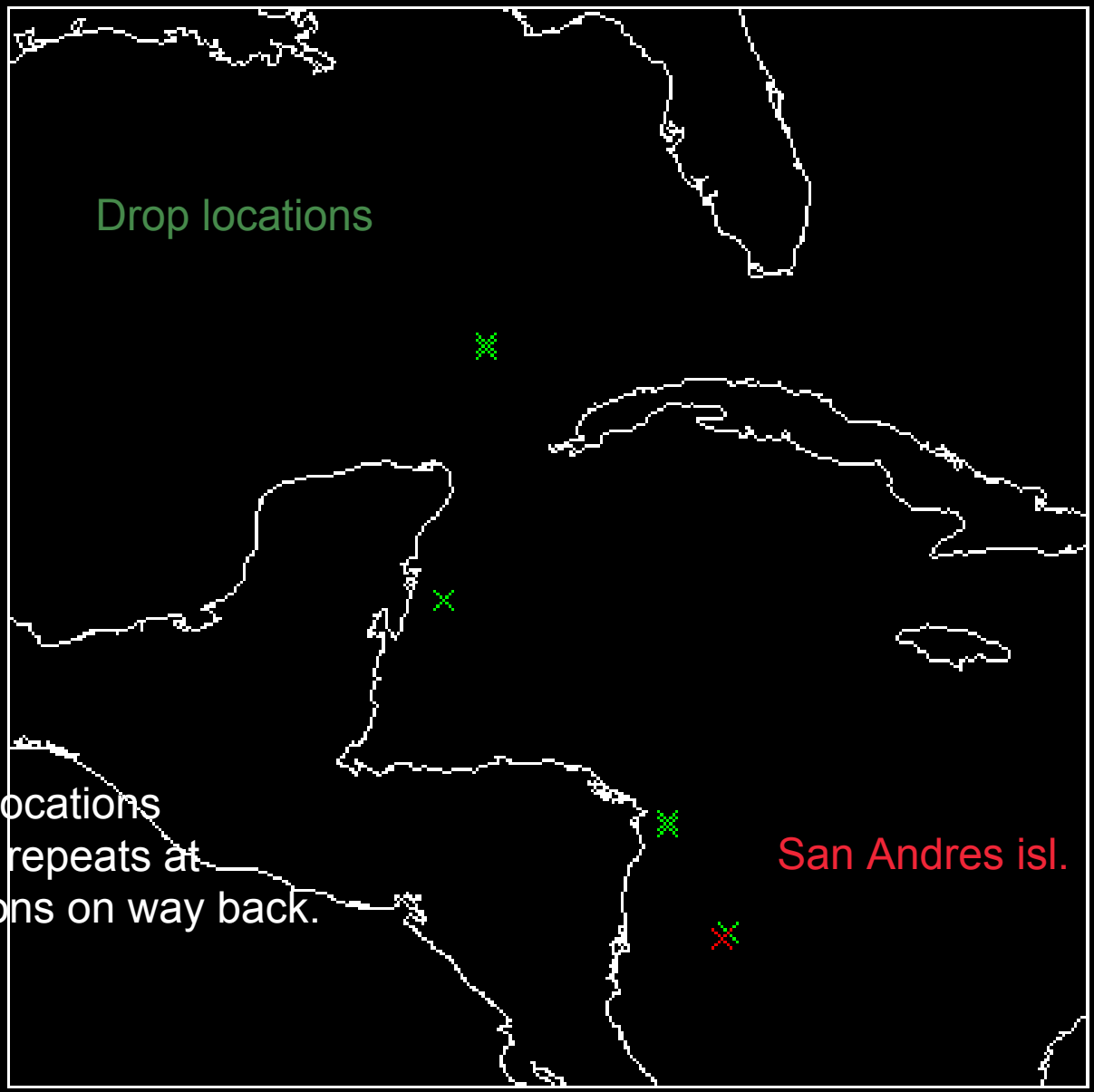


II. In-situ cirrus nucleation in adiabatic cooling conditions

Steve Sherwood, Yale University

Thanks to: J. Alexander, B. Anderson, D. Baumgardner, R. Herman,
P. Lawson, L. Pfister, T. Thompson, E. Weinstock

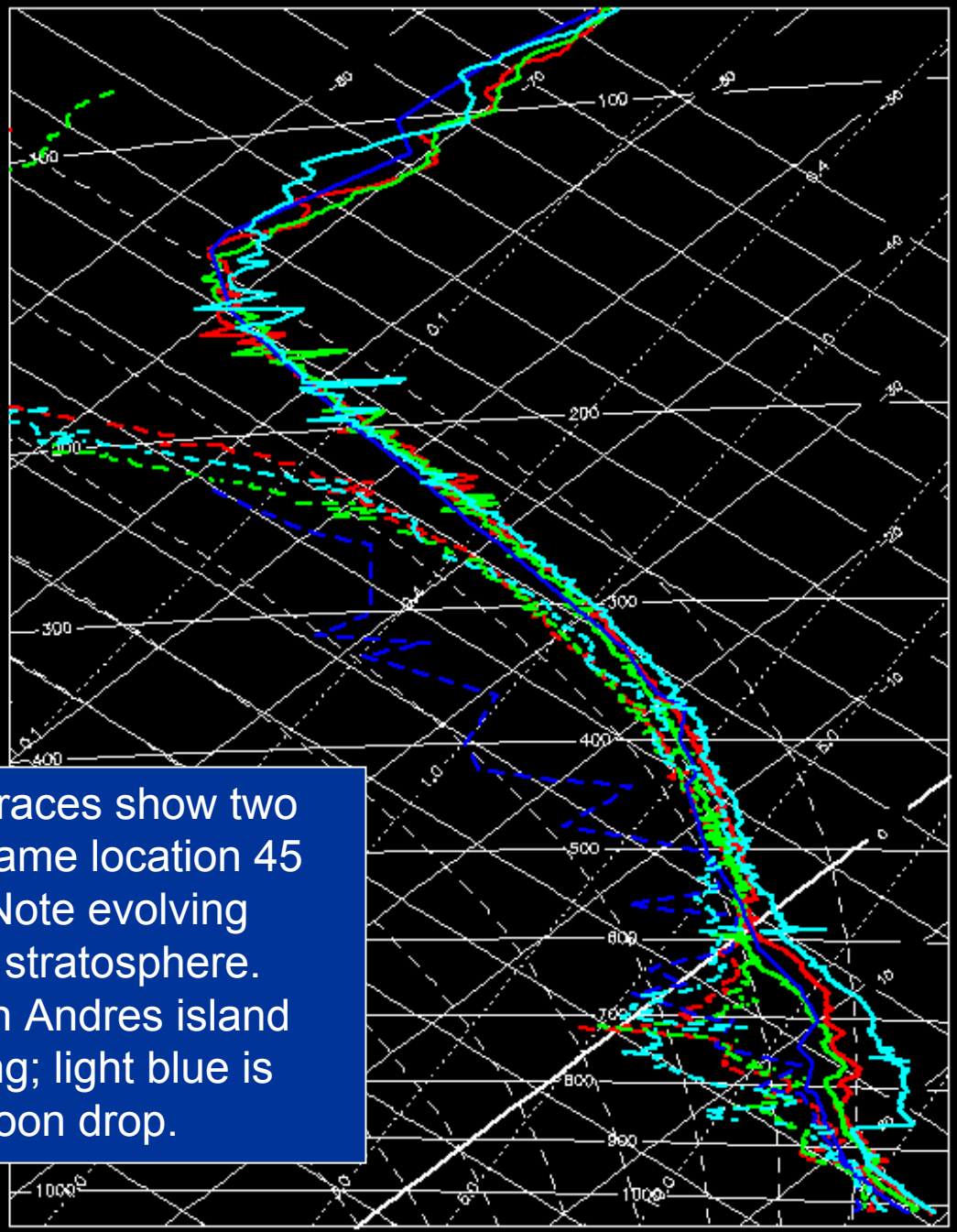
- Key issues: approach to phase equilibrium; dehydration possibilities.
  - Time required to grow cirrus?
  - Nucleation mechanisms? Equilibrium?
  - Clouds formed in situ have significant IWC?
- Examine wave case on 7/9 southbound mission.



Dropsonde locations on 9th; note repeats at some locations on way back.

T

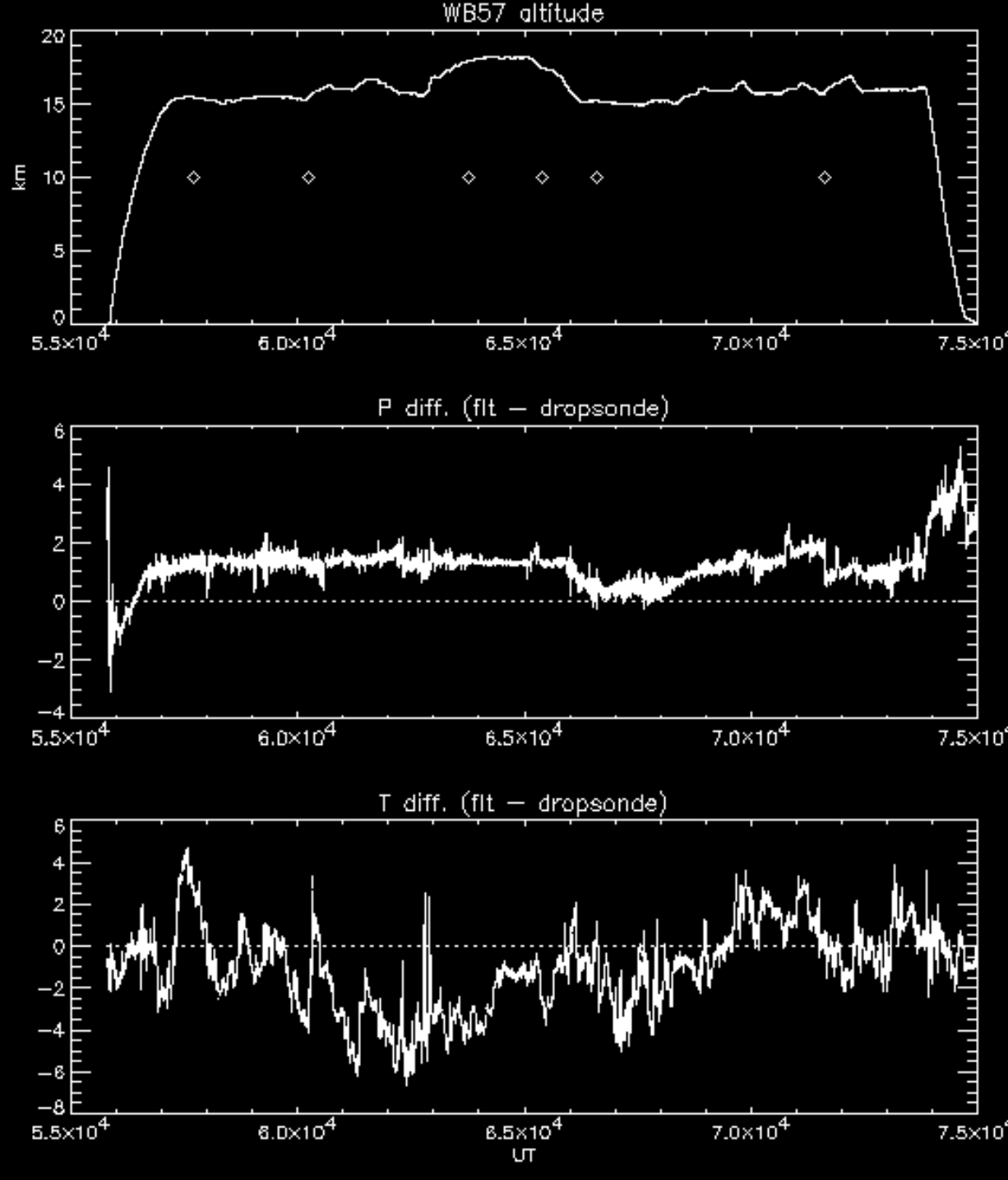
T_D

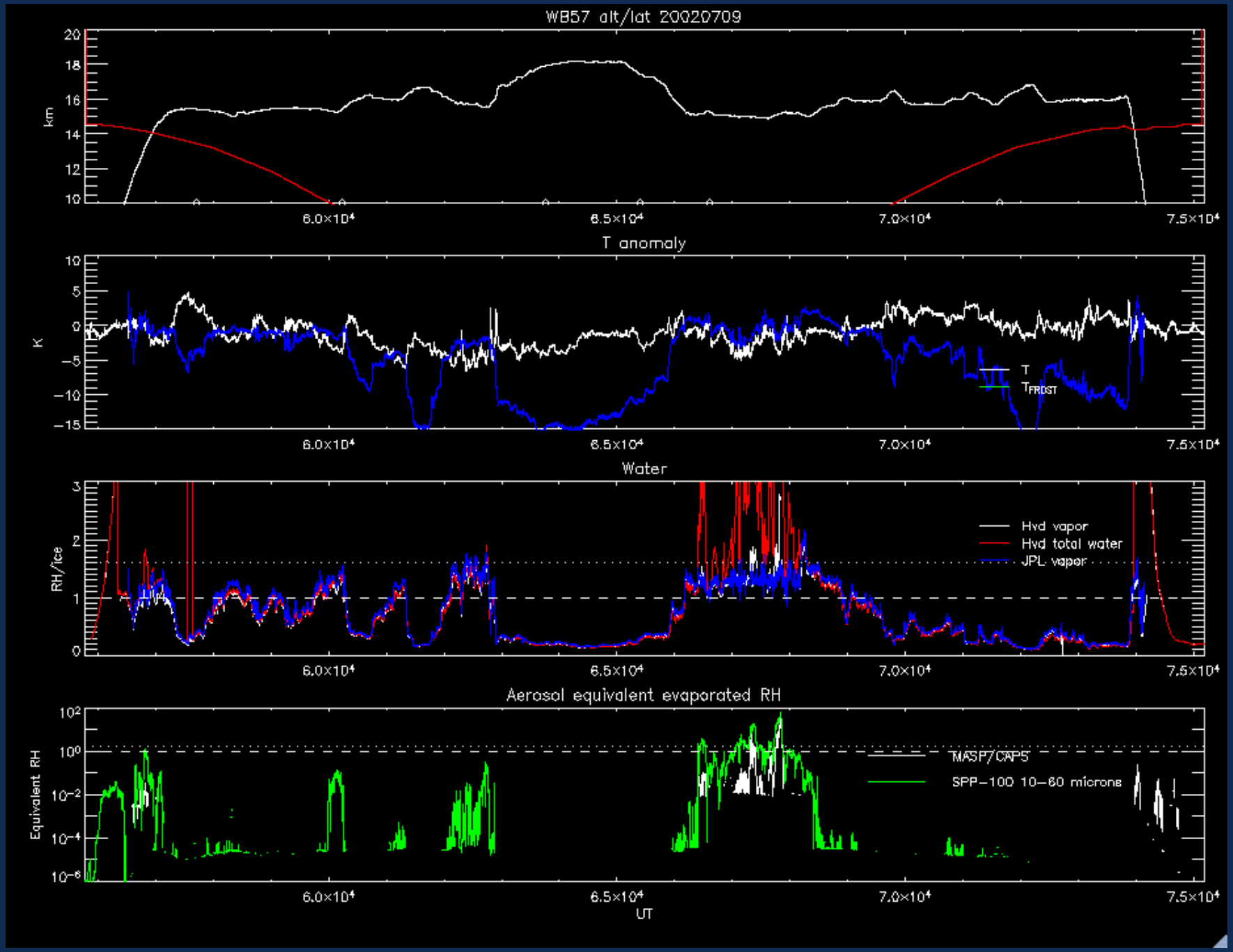


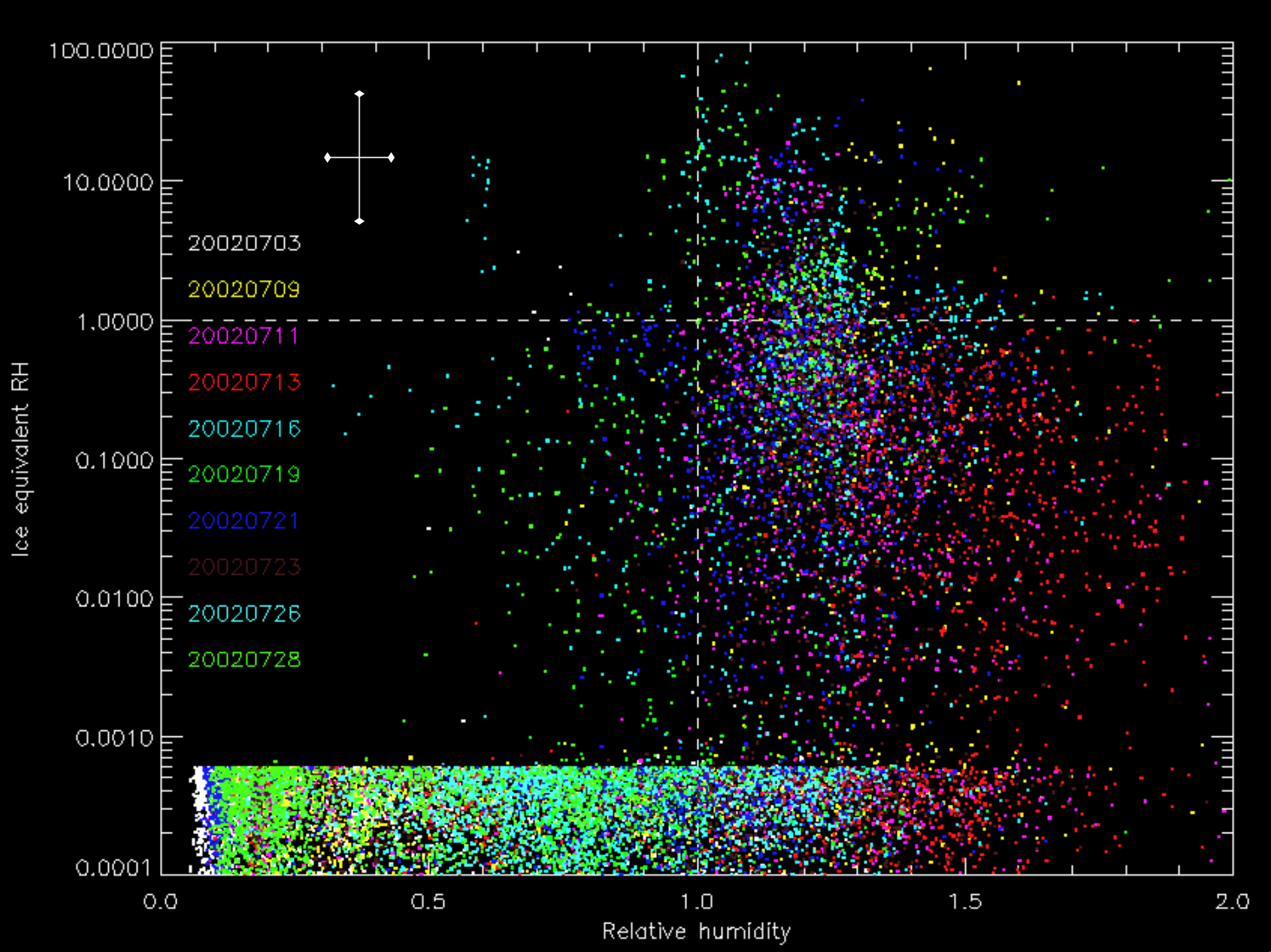
Red and green traces show two dropsondes at same location 45 minutes apart. Note evolving gravity waves in stratosphere. Blue trace is San Andres island morning sounding; light blue is colocated afternoon drop.

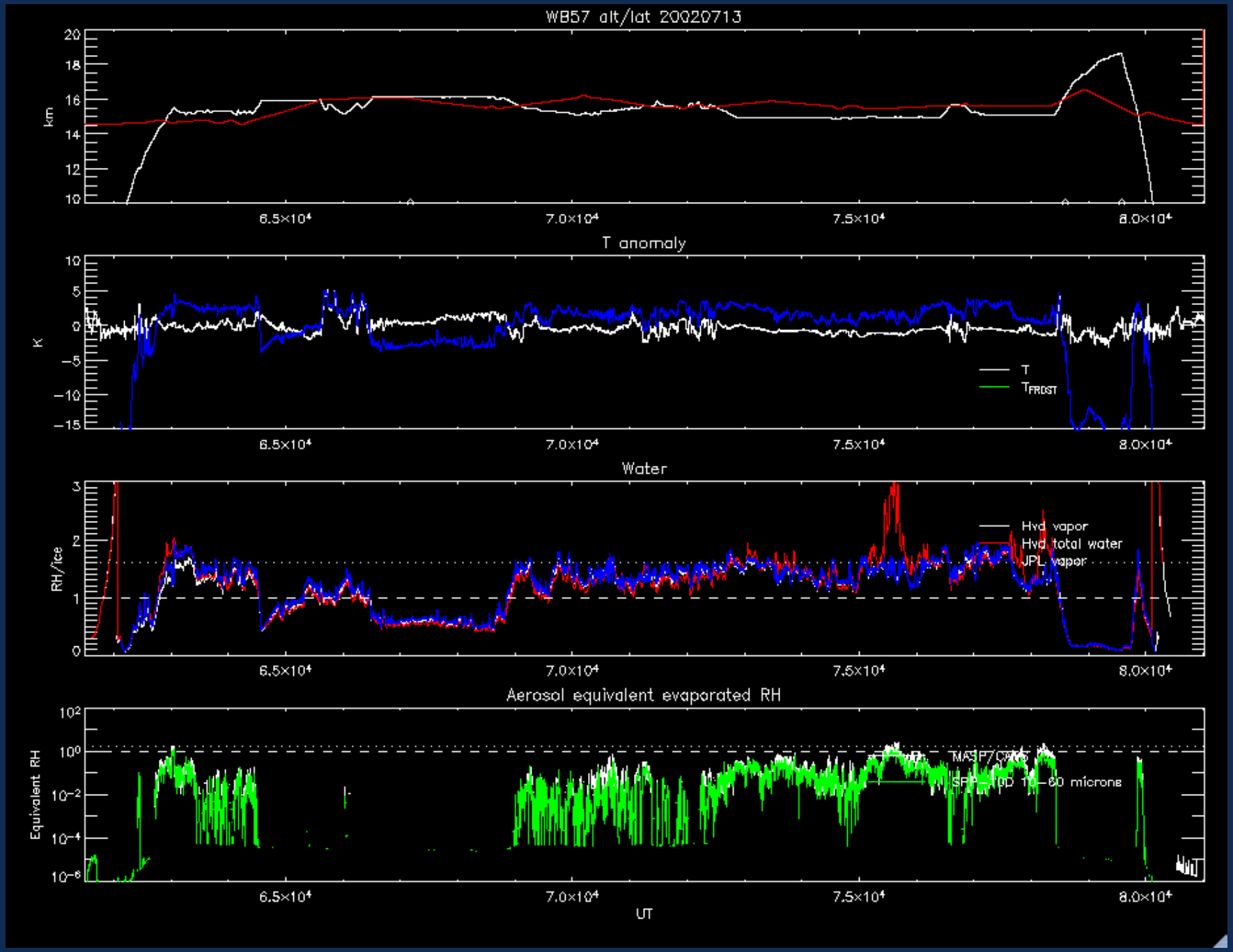
Comparison of Thompson/Rosenlof T,p w/dropsondes indicates agreement of P to ~1 hPa*, T bias = -.30 +/-.16K above 10 km.

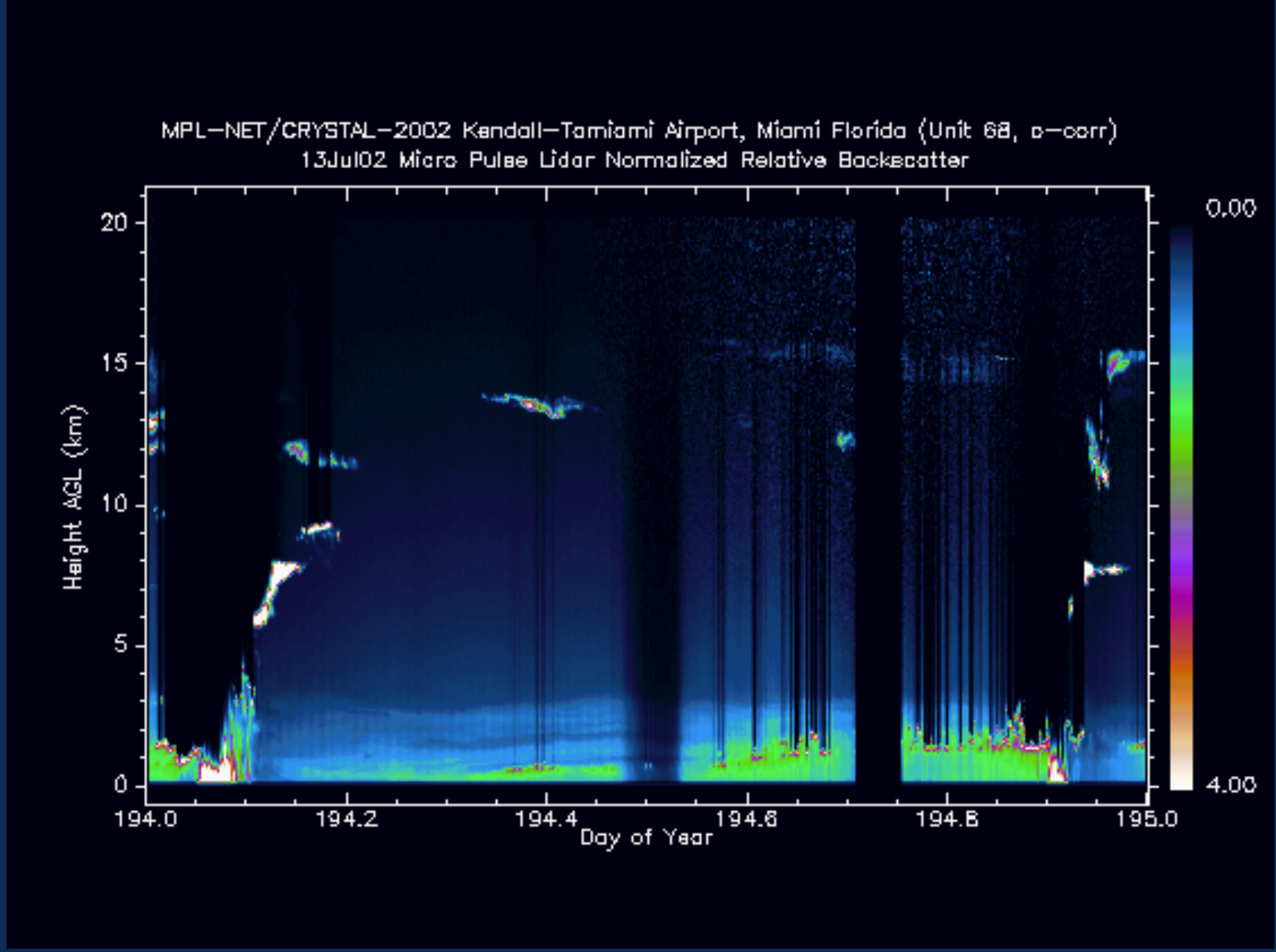
*except takeoff/landing.



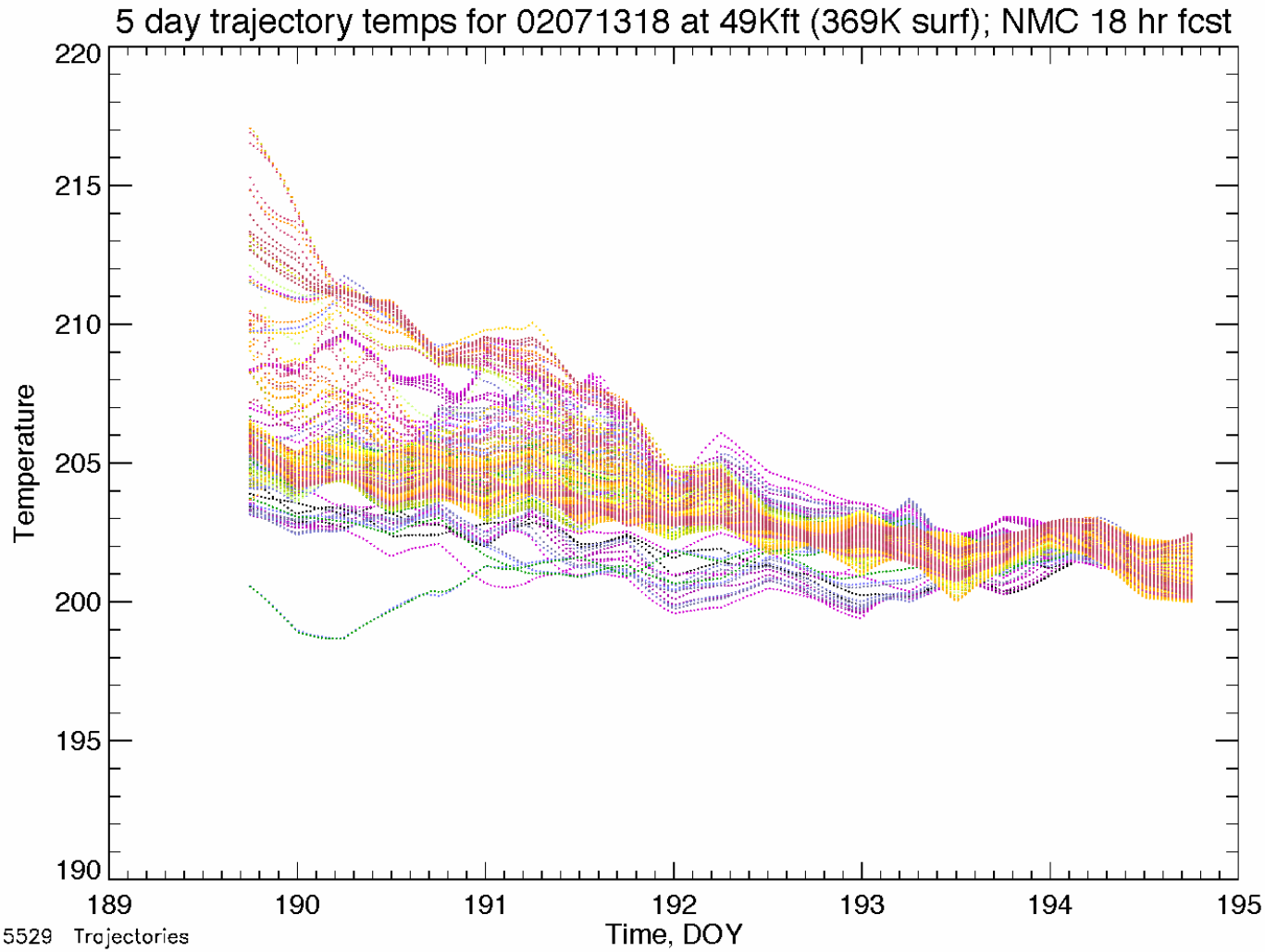

WB57 alt/lat 20020709
km
20
18
16
14
12
10
6.0×10⁴
6.5×10⁴
7.0×10⁴
7.5×10⁴
T anomaly
K
10
5
0
−5
−10
−15
T
T_FRDST
Water
RH/Ice
3
2
1
0
Hvd vapor
Hvd total water
JPL vapor
Aerosol equivalent evaporated RH
Equivalent RH
10²
10⁰
10⁻²
10⁻⁴
10⁻⁶
MASP/CAPS
SPP-100 10-60 microns
UT


100.0000
10.0000
1.0000
0.1000
0.0100
0.0010
0.0001
Ice equivalent RH
20020703
20020709
20020711
20020713
20020716
20020719
20020721
20020723
20020726
20020728
0.0
0.5
1.0
1.5
2.0
Relative humidity


WB57 alt/lat 20020713
km
20
18
16
14
12
10
6.5×10⁴
7.0×10⁴
7.5×10⁴
8.0×10⁴
T anomaly
K
10
5
0
−5
−10
−15
T
T_FRDST
Water
RH/ice
3
2
1
0
Hvd vapor
Hvd total water
JPL vapor
Aerosol equivalent evaporated RH
Equivalent RH
10²
10⁰
10⁻²
10⁻⁴
10⁻⁶
MASP/CWS
SPP-100 10–60 microns
UT



July 13: The cirrus observed over Miami appeared only after the morning. Temperatures observed by PARSL at 125 mb dropped quickly in the morning, for a total of 2K drop by afternoon. Light & variable winds also suggest in-situ cooling rather than advection may have been responsible. Thickness of cirrus (2 km in ER-2 lidar) suggests youth.



Lenny Pfister's calculation of parcel temperature histories prior to July 13 in the flight region. Cold temperatures are apparently new for these air parcels.

Summary

- Wave clouds form within ~1 hr when RH_i>100%, <160%, but IWC <<< VWC.
- Homogeneous nucleation not evident in these data? (Supersaturations to 80%, especially on day with rapid cooling near thin cirrus outflows.)
- Evidence of preference for <30% SS…evidence of major role for “weak” IN?
- Further work/collaboration needed on habit and size information.